

Claims

1. Method for using the complete resource capacity of a synchronous digital hierarchy network, subject to a protection mechanism, in the presence of a data (packet) network, said network comprising nodes bidirectionally transmitting TDM and Data traffic over Working and Protection capacity/channels, wherein said method comprises the following steps, in case of failure at the affected nodes:
- the working capacity is cut;
 - the TDM traffic is subject to said protection mechanism, and is shifted over the protection capacity;
 - a part of high priority data traffic is shifted over the protection capacity;
 - a part of low-priority data traffic, transported over the protection capacity in normal conditions, is caused to share the remaining protection capacity with the low-priority part of the data traffic, transported over the working capacity in normal conditions, in such a way as the complete protection capacity is used to carry data traffic in both normal and failure conditions.
2. Method according to claim 1, wherein said method comprises the further step of reserving a part of the protection capacity to carry NUT (Not pre-emptive Unprotected Traffic) data traffic in both normal and failure conditions.
3. Method according to claim 1, wherein said sharing of the remaining protection capacity for carrying the low priority data traffic is made by applying a function of statistical multiplexing to said low priority data traffic coming from both the working and the protection capacity, so as in case of failure there is not a service interruption, but only a service degradation.
4. Method according to claim 2, wherein said sharing of the remaining protection capacity for carrying the low priority data traffic is made by applying a function of statistical multiplexing to said low priority data traffic coming from both the working and the protection

capacity, so as in case of failure there is not a service interruption, but only a service degradation.

5 5. Method according to claim 1, wherein in said network nodes an Actuator function is performed on the connection matrix of the cross-connect, whereby in case of failure the new matrix connections to the protection capacity are established in order to restore the failed working capacity, said Actuator function causing the performing of the following actions on said protection capacity, in case
10 of failure:

- squelching partially the low priority traffic, present before the failure, and pre-empting only the part necessary for carrying said TDM and high priority data traffic;
- Bridge and Switch: acting the cross-connection matrix to restore the
15 TDM and high priority data traffic;
- balancing the access for the low priority data traffic to the remaining spare capacity by said statistical multiplexing.

20 6. Method according to claim 2, wherein in said network nodes an Actuator function is performed on the connection matrix of the cross-connect, whereby in case of failure the new matrix connections to the protection capacity are established in order to restore the failed working capacity, said Actuator function causing the performing of the following actions on said protection capacity, in case
25 of failure:

- squelching partially the low priority traffic, present before the failure, and pre-empting only the part necessary for carrying said TDM and high priority data traffic;
- Bridge and Switch: acting the cross-connection matrix to restore the
30 TDM and high priority data traffic;
- balancing the access for the low priority data traffic to the remaining spare capacity by said statistical multiplexing.

7. Method according to claim 3, wherein in said network

nodes an Actuator function is performed on the connection matrix of the cross-connect, whereby in case of failure the new matrix connections to the protection capacity are established in order to restore the failed working capacity, said Actuator function causing the performing of the following actions on said protection capacity, in case of failure:

- squelching partially the low priority traffic, present before the failure, and pre-empting only the part necessary for carrying said TDM and high priority data traffic;
- Bridge and Switch: acting the cross-connection matrix to restore the TDM and high priority data traffic;
- balancing the access for the low priority data traffic to the remaining spare capacity by said statistical multiplexing.

8. Method according to claim 1, wherein said network is a ring network subject to a MS/SPRING protection mechanism.

9. Network node for carrying out the method of claim 1, wherein said network node comprises:

- a first switching element to switch the TDM traffic over the TDM part of the working channels, in the non-failure condition, or over the protection capacity in case of failure;
- a second switching element for the data traffic, comprising circuits to perform the following actions:
 - recognizing the class of service of the input data, said high or low priority data traffic;
 - assigning the data traffic to the correct output on said working or protection capacity in both non-failure and failure conditions, so as in failure conditions all the high priority data traffic is switched over the protection capacity, and the low priority data traffic is switched over the protection capacity according to said function of statistical multiplexing.

10. Network node according to claim 9, wherein said second switching element comprises:

- an input mapper module for the said recognizing of the class of service of the input data;
- a load balancer module for the said assigning of the data traffic to the correct output in both non-failure and failure conditions, said load balancer comprising circuits for:
 - dividing the high priority from the low priority data by mapping them in different Virtual Containers (VCs) of the synchronous digital hierarchy frames;
 - applying the said function of statistical multiplexing for the low priority data traffic to access the dedicated VCs;
 - balancing the low priority data traffic in both non-failure and failure conditions, so as in failure conditions said low priority data traffic is switched over the protection capacity according to said function of statistical multiplexing.

11. Synchronous digital hierarchy network, subject to a protection mechanism, with a data (packet) network deployed over it, said network comprising means for performing the method of claim 1.

12. Synchronous digital hierarchy network, subject to a protection mechanism, with a data (packet) network deployed over it, said network comprising network nodes according to claim 9.